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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/064,042	06/04/2002	Wen-Long Tseng	VIAP0051USA	9773
27765	7590	02/15/2006	EXAMINER	
NORTH AMERICA INTELLECTUAL PROPERTY CORPORATION P.O. BOX 506 MERRIFIELD, VA 22116			HARPER, V PAUL	
			ART UNIT	PAPER NUMBER
			2654	

DATE MAILED: 02/15/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 10/064,042	Applicant(s) TSENG ET AL.	
	Examiner V. Paul Harper	Art Unit 2626	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-10 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1-10 is/are rejected.
- 7) ☐ Claim(s) ____ is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on ____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
 Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
 Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. ____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|--|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. ____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date ____ | 6) <input type="checkbox"/> Other: ____ |

DETAILED ACTION

Specification

1. The disclosure is objected to because of the following informalities: the following equations are illegible or nearly illegible: ¶'s [0009], [0022], [0024], [0026].

Appropriate correction is required.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

2. Claims 1-10 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

In claim 1, it is unclear what the phrase "presetting a first impulse response with regard to a frequency response of a digital audio signal" means. A "frequency response" is typically defined as an indication of how a system component (circuit, device, filter, etc.) responds to the different frequencies applied to it (e.g., you can have a frequency response of a circuit, but not a frequency response of a signal). Thus the phrase "a frequency response of a digital audio signal" is unclear.

For the purposes of the rejections given below the phrase in question is interpreted to mean presetting a first impulse response (of a device/equalizer) so as to

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adjust the amplitude of a controlled range of frequencies and thus modify a digital audio signal (input signal).

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

3. Claims 1, 3, 6-8, and 10 are rejected under 35 U.S.C. 102(b) as being anticipated by Gaydecki, Patrick ("A real time programmable digital filter for biomedical signal enhancement incorporating a high-level design interface" 2000, *Physiological Measurement* 21 pp. 187-196), hereinafter referred to as Gaydecki.

Regarding **claim 1**, Gaydecki discloses a real time programmable digital filter that can be used for audio signal enhancement (p. 187, Title, § 1. Introduction).

Gaydecki's teachings include:

- [see 112 2nd rejection, above] presetting a first impulse response with regard to a frequency response of a digital audio signal, said first impulse response having a plurality of first sampling points in time domain, a total number of said first sampling points equaling a first predetermined value, each first sampling point corresponding to a first amplitude (p. 190, ¶¶ a) and b), specify frequency response, perform inverse transform, generated time-domain function [first impulse response], where the number

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of sample points can be determined, §2, Basic DSP filter theory, n.b. the ability to set maximum count values, p. 192, item (e) Sample gain adjustment, p. 193 (a) design the FIR according to the user's specification);

- establishing a second impulse response by selecting a plurality of first sampling points and related first amplitudes from said first impulse response to function as second sampling points and related second amplitudes of said second impulse response, a total number of said second sampling points being less than said first predetermined value (p. 190, ¶'s (b) and (c) truncate the impulse response to determine the second impulse response, c.f. Fig. 1c with Fig. 4 in the specification);
- processing said audio signal in time domain by said second impulse response according to a predetermined algorithm (p. 190, ¶ (d) the finite impulse response is then convolved with the input signal to generate the filtered response).

Regarding **claim 3**, Gaydecki teaches everything claimed, as applied above (see claim 1). In addition, Gaydecki teaches "said first sampling points are spaced by a fixed interval in time domain." (p. 190, item (b) and Fig. 1b; the interval will be inherently fixed either from universal practice or the conventional results of the inverse transform).

Regarding **claim 6**, Gaydecki teaches everything claimed, as applied above (see claim 1). In addition, Gaydecki teaches that the "digital audio signal is generated by

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performing a pulse code modulation (PCM) on an analog audio signal" (§5, sampling by the ADC produces a PCM signal; Fig. 2, ADC).

Regarding **claim 7**, Gaydecki teaches everything claimed, as applied above (see claim 6). In addition, Gaydecki teaches "a sampling rate of said pulse code modulation determines an interval between each sampling point in time domain" (p. 192, Item (e) sample rate adjustment, where sampling rate inherently determines the interval $[T(\text{sec}) = 1/S.R. (\text{samples/sec})]$).

Regarding **claim 8**, Gaydecki teaches everything claimed, as applied above (see claim 1). In addition, Gaydecki teaches "said predetermined algorithm is a convolution algorithm" (abstract, p. 188, 2nd ¶2, "implements the convolution operations; §2).

Regarding **claim 10**, Gaydecki teaches everything claimed, as applied above (see claim 1). In addition, Gaydecki teaches "said second impulse response is generated from said first impulse response multiplied by a window function in time domain" (p. 190, ¶(e) the truncation [generating the second impulse response] may be performed with a rectangular [window] function).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

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(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 2 and 9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Gaydecki in view of Greenfield et al. ("Efficient Filter Design for Loudspeaker Equalization" J. Audio Eng. Soc. Vol. 39, No. 10, 1991, Oct), hereinafter referred to as Greenfield.

Regarding **claim 2**, Gaydecki teaches everything claimed, as applied above (see claim 1). In addition, Gaydecki teaches that his techniques can be applied to audio signal enhancement (§1 Introduction, sentence two). But Gaydecki does not specifically teach applying the method to a digital equalizer. However, the examiner contends that this concept was well known in the art, as taught by Greenfield.

In the same field of endeavor, Greenfield teaches loudspeaker equalization using a technique where the equalizer is determined by an impulse response derived from a complementary frequency response of a loudspeaker system (p. 741, §2, ¶11).

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify Gaydecki by specifically applying his teachings [simplified design of digital filters] to equalizers used with speakers, as taught by Greenfield, because it is well known in the art at the time of invention that a standard digital equalizer that could be matched to a variety of commercially available speakers is an attractive product (Greenfield, §0 Introduction, ¶3), and furthermore it is advantageous to implement the equalizers with the design tool described by Gaydecki

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since it obviates the need for the user to have a detailed knowledge of filter design theory (Gaydecki, abstract).

Regarding **claim 9**, Gaydecki in view of Greenfield teaches everything claimed, as applied above (see claim 2). In addition, Gaydecki teaches "said digital equalizer is a software program" (p. 188, ¶2, filter is designed and downloaded).

5. Claims 4 and 5 are rejected under 35 U.S.C. 103(a) as being unpatentable over Gaydecki in view of well known prior art (MPEP 2144.03).

Regarding **claim 4**, Gaydecki teaches everything claimed, as applied above (see claim 1). In addition, Gaydecki indicates pre- and post-truncation impulse response amplitudes (Fig. 1, curves **b** and **c**, respectively) where the average power of curve **c** is clearly greater than the average power of curve **b**. In addition, Gaydecki teaches that the truncation may be performed by a rectangular function (p. 190, ¶(c)), and that the filter may be designed according to the user's specifications (p. 193, item (a); Fig. 3). Thus, it would be obvious for a user of Gaydecki's system to set a design criterion such that "an average power of said second amplitudes associated with said second impulse response is greater than a predetermined percentage of an average power of said first amplitudes associated with said first impulse response."

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify Gaydecki as indicated above, because such

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a criterion clearly links the tradeoff between filter quality (wider response curve **c**) and computational efficiency (narrower response curve **c**) and would thus simplify the design process.

Regarding **claim 5**, Gaydecki in view of well known prior art teaches everything claimed, as applied above (see claim 4). In addition, Gaydecki teaches "said predetermined percentage is 99%" (Fig. 1, by visually comparing curves **b** and **c** it is clear that the average value of the area under $x^2(t)$ in curve **c** is more than a factor of two greater than the average value of the area under $x^2(t)$ in curve **b** (n.b. if A is 100% (approximately 99%) greater than B, A is twice the size of B).

Citation of Pertinent Art

6. The following prior art made of record but not relied upon is considered pertinent to the applicant's disclosure:

- Hildebrand (U.S. Patent 5,727,074) discloses a method for efficient filtering and equalization of audio signals.
- Gilloire et al. (U.S. Patent 6,968,352) disclose a device for digital processing with frequency filtering and reduced computation complexity.
- Gardner ("Efficient Convolution without Input-Output Delay" J. Audio Eng. Soc., Vol. 43, No. 3, 1995, March) teaches an efficient block FFT implementation of convolution.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to V. Paul Harper whose telephone number is (571) 272-7605. The examiner can normally be reached on M-F.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David Hudspeth can be reached on (571) 272-7843. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

2/10/2006

V. Paul Harper
Patent Examiner
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A handwritten signature in black ink, appearing to read "V. Paul Harper", is written over the printed name and title.